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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER	
VIDA, MELANIE M	
ART UNIT	**PAPER NUMBER**
2626	

DATE MAILED: 05/06/2004 4

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/667,439	USUI ET AL.	
	Examiner	Art Unit	
	Melanie M Vida	2626	

-- *The MAILING DATE of this communication appears on the cover sheet with the correspondence address* --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on 22 September 2000.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-42 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-42 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 22 September 2000 is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

JEROME GRANT II
PRIMARY EXAMINER

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date 2.

4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement(s) (IDS) submitted on 9/22/00 has been considered by the examiner and is attached to this office action.

Priority

2. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Drawings

3. The drawings are objected to because there is a misspelled word in step C50. The correct spelling is "Laplacian".

A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Specification

4. The disclosure is objected to because of the following informalities: Please insert –filling—instead of "filing" on line 12, page 3.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

6. **Claims 1-9, and 22-42** are rejected under 35 U.S.C. 102(e) as being anticipated by Williams et al. US-PAT-NO: 6,427,030 B1, (hereinafter, Williams).

Regarding, **claim 1,** Williams, as shown in figure 29, teaches a dynamic error diffusion, which reads on "a halftoning method" to reduce the number of levels of a multilevel gray scale pixel value representing an image to a number of levels renderable by an output device (i.e. a binary system), which reads on "a method of converting a multilevel input image into a binary image", (col. 1, lines 6-14; col. 22, lines 55-62). The inputted video data is binarized so as to output binarized image data, which reads on "(a) converting the multilevel value", (col. 22, lines 45-47). The current video image data, which reads on "of a given noteworthy pixel" is compared with a threshold and a result, a binary value, is outputted as image data capable of being rendered

by a binary device (i.e. a printer), which reads on "of the multilevel input image into a binary value", (col. 7, lines 20-23; col. 8, lines 23-29; col. 22, lines 45-47; col. 28, lines 63-67). It is inherently taught that the dynamic error-diffusion process occurs "while pixels of the multilevel input image are scanned successively;" as evidenced by the prior-art illustrated in figure 38, and the embodiment of the invention, as shown in figure 52, wherein the coefficient for the pixel that is one over in the fast scan direction and one down in the slow scan direction from the currently processed pixel is 1/16, (col. 7, lines 1-2; col. 10, lines 9-17; col. 26, lines 52-65). An error calculation circuit (1) distributes error terms, which reads on "(b) diffusing a possible error", (col. 8, lines 29-40). The error selection has occurred as a result of the binarized image data (7), which reads on "which has occurred in binary value", with respect to video image data, which reads on "with respect to the noteworthy pixel", (col. 8, lines 23-29; col. 22, lines 47-54).

As shown in figure 38, the error terms are not propagated to pixels that have already been scanned (0), instead the error is propagated to downstream pixels that are not scanned, which reads on "to unscanned pixels adjacent to the noteworthy pixel by one diffusion technique;" (col. 8, lines 58-65; col. 10, lines 9-16). As shown in figures 5, and 6, the propagation of the error depends on the weighting coefficients of the error diffusion process, wherein the possible sets of coefficients are selected based on the determination of the image type, such as line text, and continuous tone data, respectively, which reads on "(c.) changing the technique of said diffusing to another in accordance with a predetermined manner as the scanning of the successive pixels of the multilevel input image progresses", (col. 9, lines 23-34).

Regarding, **claim 2,** Williams, as shown in figures 5-6, teaches an image segmentation module (segmentation circuit (15) of figure 2) to detect the type of image being presently

processed and to activate or deactivate various image processing modules (14, 12, 9 of figure 2), which reads on "discriminating whether or not the noteworthy pixel is a pixel constituting part of a profile of the multilevel input image", (col. 9, lines 10-25). A binarization process produces a weighting coefficient scheme adapted for continuous tone data and line text, which reads on "wherein if the result of said discriminating in step (b) is positive, the error diffusion technique is changed from one to another in step (c.)" (col. 9, lines 20-52).

Regarding, **claim 3,** Williams, as shown in figure 39, teaches a method to determine a partial rendering of a whole pixel by drawing a line to connect the modified pixel values P0 and P1, and a line representing a threshold at 128, that determines which sub-pixels between P0 and P1, are rendered or printed, which reads on "detecting the direction in which the profile of the multilevel input image extends with respect to the noteworthy pixel, wherein if the result of said discriminating is positive, in step (b), values according to the occurred error are added to the values of the unscanned pixels along the detected direction of the profile as an exceptional process", (col. 11, lines 17-25).

Regarding, **claim 4,** Williams, as shown in figures 4-5, teaches that the coefficients of the weighting matrix for each pixel in a window, that is part of either continuous image data, or adjusted for line text, which reads on "wherein in step (c.) the error diffusion technique is changed for every pixel of the multilevel input image", (col. 9, lines 7-52).

Regarding, **claim 5,** Williams, as shown in figure 3, detects an image characteristic data, (i.e. line art, or continuous image data) of an unprocessed image data, which reads on "further

comprising discriminating whether or not the noteworthy pixel is a pixel constituting a profile", (col. 8, lines 34-40). Williams inherently teaches, "and detecting the direction in which the profile of the multilevel input image extends with respect to the noteworthy pixel, wherein if the result of said discriminating is positive in step (b) values according to the occurred error are added to the values of the unscanned pixels along the detected direction of the profile as an exceptional process", as evidenced in that the address generator (20) generates an address for selecting the proper weighting scheme in the distribution coefficient memory (40) based on received image characteristic data and the weighting coefficients are used for proper propagation of the error terms to downstream pixels", (col. 8, lines 41-50).

Regarding, **claim 6,** Williams states that the weighted coefficients for error diffusion is chosen as those among figures 4-6, after the image segmentation process determines that the pixel being processed is of a particular type on the basis of decoding of the effect data word or pointer tag that indicates if the pixel is line art, or continuous tone data, for example, which reads on "wherein said profile discriminating is carried out by calculating a profile value of the noteworthy pixel based on both the multilevel value of the noteworthy pixel and those of the adjacent pixels, and comparing the calculated profile value with a predetermined value", (col. 9, lines 10-33).

Regarding, **claims 7-9,** please refer to the corresponding rejection in claim 6.

Regarding, **claims 22-25,** Williams, as shown in figure 16, illustrates that the error from the binarization process is calculated based on the difference in the desired output and actual output (i.e. the addition of nearby sub-pixels), which reads on "wherein the profile value is

directly calculated by making addition and subtraction individually on the multilevel values of the noteworthy pixel and the adjacent pixels", (col. 18, lines 38-46; col. 19, lines 19-25).

Regarding, **claims 26-27,** Williams, as shown in figures 5-6, states that the weights for distributing the error to downstream pixels is changed according to the type of image classification such as line art, text, or continuous image data, which reads on "wherein in said changing step (c.), the error diffusion technique is changed to another that is selected in a predetermined order from a plurality of error diffusion techniques", (col. 9, lines 10-52).

Regarding, **claims 28-29,** please refer to figure 38, and figures 5-6, which reads on "in said error diffusing step (b.), the error diffusion technique of proportionally distributing the occurred error to the plural unscanned pixels adjacent to the noteworthy pixel in accordance with said predetermined weighting pattern, and in said technique changing step (c.), the error diffusion technique is changed by changing said predetermined weighting pattern to another", (col. 9, lines 10-52; col. 10, lines 9-17).

Regarding, **claims 30-32,** Williams, inherently teaches, "if a plurality of multilevel input images to be halftoned have an approximate profile, said discriminating is carried out for only one of the plural multilevel input images, and the result of said discriminating is used in halftoning the remaining multilevel input images" as evidenced in that the utilization of error diffusion can render complex images that contain a mixture of text and picture and eliminates the need for image segmentation to separate the text from the picture so that the picture part of the document can be screened and the text part of the document can be thresholded, (col. 9, lines 45-52).

Regarding, **claim 33,** Williams, as shown in figure 29, teaches a dynamic error diffusion apparatus, which reads on "a halftoning apparatus" to reduce the number of levels of a multilevel gray scale pixel value representing an image to binary levels renderable by an output device (i.e. a binary system), which reads on "for converting a multilevel input image into a binary image", (col. 1, lines 6-14; col. 7, lines 18-23; col. 29, lines 1-6; col. 22, lines 55-62). A binarization circuit (7) for converting, which reads on "a binarizing section for converting" unprocessed image data, which reads on "the multilevel value of a given noteworthy pixel" to threshold image data, which reads on "of the multilevel input image into a binary value", (col. 7, lines 20-23; col. 8, lines 23-28; col. 22, lines 47-54). It is inherently taught that the dynamic error-diffusion process occurs "while pixels of the multilevel input image are scanned successively;" as evidenced by the prior-art illustrated in figure 38, wherein the coefficient for the pixel that is one over in the fast scan direction and one down in the slow scan direction from the currently processed pixel is 1/16, (col. 7, lines 1-2; col. 10, lines 9-17). An error calculation circuit (1), which reads on "an error diffusing section" diffuses error terms, which reads on "for diffusing a possible error" that has occurred between threshold image data, which reads on "which has occurred in binary value" with respect to unprocessed image data, which reads on "with respect to the noteworthy pixel" to unscanned pixels, as shown in figure 38, that are one line over in the fast scan direction, and one scan down in the slow scan direction, which reads on "to unscanned pixels adjacent to the noteworthy pixel by one diffusion technique", (col. 8, lines 30-33; col. 10, lines 9-17; col. 22, lines 16-37). A coefficient matrix circuit (5), which reads on "an error diffusion technique changing section" distributes the error based upon a set of weighting coefficients based on received image characteristic data, which reads on "for changing said one

diffusion technique to another in accordance with a predetermined manner as the scanning of the successive pixels of the multilevel input image progresses", (col. 8, lines 40-50; col. 22, lines 29-37).

Regarding, **claim 34,** Williams, as shown in figures 5-6, teaches an image segmentation module (segmentation circuit (15) of figure 2) to detect the type of image being presently processed and to activate or deactivate various image processing modules (14, 12, 9 of figure 2), which reads on "further comprising a pixel-on-profile detection section for discriminating whether or not the noteworthy pixel is a pixel constituting part of a profile of the multilevel input image", (col. 9, lines 10-25). A binarization process produces a weighting coefficient scheme adapted for continuous tone data and line text, which reads on "wherein if the result of said discriminating in step (b) is positive, the error diffusion technique is changed from one to another in step (c.)" (col. 9, lines 20-52).

Regarding, **claim 35,** Williams, as shown in figure 39, teaches a method to determine a partial rendering of a whole pixel by drawing a line to connect the modified pixel values P0 and P1, and a line representing a threshold at 128, that determines which sub-pixels between P0 and P1, are rendered or printed, which reads on "a direction-of-profile detection section for detecting the direction in which the profile of the multilevel input image extends with respect to the noteworthy pixel, wherein if the result of said discriminating is positive, in step (b), values according to the occurred error are added to the values of the unscanned pixels along the detected direction of the profile as an exceptional process", (col. 11, lines 17-25).

Regarding, **claim 36,** Williams, as shown in figures 4-5, teaches that the coefficients of the weighting matrix for each pixel in a window, that is part of either continuous image data, or

adjusted for line text, which reads on "wherein said error diffusion technique changing section changes the error diffusion technique for every pixel of the multilevel input image", (col. 9, lines 7-52).

Regarding, **claim 37,** Williams, as shown in figure 3, detects an image characteristic data, (i.e. line art, or continuous image data) of an unprocessed image data, which reads on "further comprising a pixel-on-profile detection section for discriminating whether or not the noteworthy pixel is a pixel constituting a profile", (col. 8, lines 34-40). Williams inherently teaches, "and a direction-of-profile detection section for detecting the direction in which the profile of the multilevel input image extends with respect to the noteworthy pixel, wherein if the result of said discriminating is positive, said error diffusion section performs and exceptional process of adding values according to the occurred error to the values of the unscanned pixels along the detected direction of the profile", as evidenced in that the address generator (20) generates an address for selecting the proper weighting scheme in the distribution coefficient memory (40) based on received image characteristic data and the weighting coefficients are used for proper propagation of the error terms to downstream pixels", (col. 8, lines 41-50).

Regarding, **claim 38,** Williams teaches that the dynamic error diffusion circuit (1), as shown in figure 29, can be implemented on an ASIC, wherein the weighting coefficients are either stored in memory, or calculated by an algorithm that is implemented by a processor, which reads on "a computer-readable recording medium in which a halftoning program for instructing a computer to execute a function" to reduce the number of levels of a multilevel gray scale pixel value representing an image to a number of levels renderable by a binary system such as a

printer, which reads on "for converting a multilevel input image into a binary image is recorded, wherein said halftoning program instructs the computer to function as follows:", (col. 1, lines 6-14; col. 7, lines 18-23; col. 28, lines 65-67; col. 29, lines 9-15; col. 22, lines 55-62). A binarization circuit (7) binarizes the inputted video data, which reads on "a binarizing section for converting the multilevel value of a given noteworthy pixel of the multilevel input image into a binary value", (col. 7, lines 20-23; col. 8, lines 23-28; col. 22, lines 45-47). It is inherently taught that the dynamic error-diffusion process occurs "while pixels of the multilevel input image are scanned successively;" as evidenced by the prior-art illustrated in figure 38, and the embodiment of the invention in figure 52, wherein the coefficient for the pixel that is one over in the fast scan direction and one down in the slow scan direction from the currently processed pixel is 1/16, (col. 7, lines 1-2; col. 10, lines 9-17; col. 26, lines 52-65). An error calculation circuit (1), which reads on "an error diffusing section" diffuses error terms, which reads on "for diffusing a possible error" that has occurred between threshold image data, which reads on "which has occurred in binary value" with respect to unprocessed image data, which reads on "with respect to the noteworthy pixel" to unscanned pixels, as shown in figure 38, and figure 52, that are one line over in the fast scan direction, and one scan down in the slow scan direction, which reads on "to unscanned pixels adjacent to the noteworthy pixel by one diffusion technique", (col. 8, lines 30-33; col. 10, lines 9-17). A coefficient matrix circuit (5), which reads on "an error diffusion technique changing section" generates coefficients for selecting the proper set of weighting coefficients based on received image characteristic data, which reads on "for changing said one diffusion technique to another in accordance with a predetermined manner as the scanning of the

successive pixels of the multilevel input image progresses", (col. 8, lines 40-50; col. 22, lines 28-37).

Regarding, **claim 39,** Williams, as shown in figures 5-6, teaches an image segmentation module (segmentation circuit (15) of figure 2) to detect the type of image being presently processed and to activate or deactivate various image processing modules (14, 12, 9 of figure 2), which reads on "wherein said halftoning program instructs the computer to function also as a pixel-on-profile detection section for discriminating whether or not the noteworthy pixel is a pixel constituting part of a profile of the multilevel input image", (col. 9, lines 10-25). A binarization process produces a weighting coefficient scheme adapted for continuous tone data and line text, which reads on "wherein if the result of said discriminating in step (b) is positive, the error diffusion technique is changed from one to another in step (c.)" (col. 9, lines 20-52).

Regarding, **claim 40,** Williams, as shown in figure 39, teaches a method to determine a partial rendering of a whole pixel by drawing a line to connect the modified pixel values P0 and P1, and a line representing a threshold at 128, that determines which sub-pixels between P0 and P1, are rendered or printed, which reads on "wherein said halftoning program instructs the computer to function also as a direction-of-profile detection section for detecting the direction in which the profile of the multilevel input image extends with respect to the noteworthy pixel, wherein if the result of said discriminating is positive, in step (b), values according to the occurred error are added to the values of the unscanned pixels along the detected direction of the profile as an exceptional process", (col. 11, lines 17-25).

Regarding, **claim 41,** Williams, as shown in figures 4-5, teaches that the coefficients of the weighting matrix for each pixel in a window, that is part of either continuous image data, or adjusted for line text, which reads on "wherein said halftoning program instructs the computer in such a manner that said error diffusion technique changing section changes the error diffusion technique for every pixel of the multilevel input image", (col. 9, lines 7-52; col. 29, lines 10-15).

Regarding, **claim 42,** Williams, as shown in figure 3, detects an image characteristic data, (i.e. line art, or continuous image data) of an unprocessed image data, which reads on "a halftoning program instructs the computer to function also as a pixel-on-profile detection section for discriminating whether or not the noteworthy pixel is a pixel constituting a profile", (col. 8, lines 34-40). Williams inherently teaches, "and a direction-of-profile detection section for detecting the direction in which the profile of the multilevel input image extends with respect to the noteworthy pixel, wherein if the result of said discriminating is positive, said error diffusion section performs and exceptional process of adding values according to the occurred error to the values of the unscanned pixels along the detected direction of the profile", as evidenced in that the address generator (20) generates an address for selecting the proper weighting scheme in the distribution coefficient memory (40) based on received image characteristic data and the weighting coefficients are used for proper propagation of the error terms to downstream pixels", (col. 8, lines 41-50).

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 10-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Williams et al. US-PAT-NO: 6,427,030 B1 as applied to claim 1 above, and further in view of Kumagai, US-PAT-NO: 5,201,013, (hereinafter, Kumagai).

Regarding, **claims 10-13,** Williams teaches the halftoning method of claims 6-9, but fails to expressly disclose, "wherein a two-dimensional digital filter dedicated to enhance the profile is used in said calculating of the profile value".

However, Kumagai, as shown in figure 25, teaches of an error filter, which reads on "a two-dimensional digital filter" with adjustable weights according to the differential value of an original image, which reads on "dedicated to enhance the profile is used in said calculating of the profile value", (col. 8, lines 39-49).

At the time the invention was made, it would have been obvious to one of ordinary skill in the art to modify Williams' halftoning method to use with Kumagai's two-dimensional filtering.

One of ordinary skill in the art would have been motivated to use a two-dimensional filter in order to enhance a character or a background area depending on the differential of an original image, given the express suggestion of Kumagai, (col. 8, lines 44-47).

Regarding, **claims 14-17,** Kumagai further teaches that the weights of the error filter can be adjusted based on a differential of an original image that is calculated by a Laplacian operator,

which reads on "wherein said two-dimensional digital filter dedicated to enhancing the profile is a Laplacian filter", (col. 8, lines 42-52).

Regarding, **claims 18-21**, Kumagai further teaches that the weights of the error filter can be adjusted based on a differential of an original image that is calculated by a Prewitt operator, which reads on "wherein said two-dimensional digital filter dedicated to enhancing the profile is a Prewitt filter", (col. 8, lines 42-52).

Conclusion

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Melanie M Vida whose telephone number is (703) 306-4220. The examiner can normally be reached on 8:30 am 5:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kimberly A Williams can be reached on (703) 305-4863. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JEROME GRANT II
PRIMARY EXAMINER

Melanie M Vida
Examiner
Art Unit 2626

MMV
mmv